

2010 Proposed Rule Draft – Starting Point for Rulemaking in 2014

ENVIRONMENTAL PROTECTION COMMISSION [567]

Notice of Intended Action

Pursuant to the authority of Iowa Code section 455B.105(3) and 455B.187, the Environmental Protection Commission hereby gives Notice of Intended Action to create new Chapter 48, Ground Heat Exchanger (GHEX) Loop Borehole Systems, and to amend Chapter 38, Private Water Well Construction Permits, Chapter 39, Requirements for Properly Plugging Abandoned Wells, Chapter 49, Non Public Water Supply Wells, and Chapter 82, Well Contractor Certification, Iowa Administrative Code.

The purpose of this rulemaking is rescind current GHEX language from Chapter 49 and to adopt new GHEX loop borehole rules that standardize the minimum construction requirements of this type of well and to create additional protections to Iowa's groundwater. The new rules will closely compare to nationwide standards that are proposed by contractor trade groups and will be more relevant to the actual geological considerations in Iowa. The following rulemaking is proposed.

Item 1. Adopt the following **new** rule, 567—Iowa Administrative Code Chapter 48, Ground Heat Exchanger (GHEX) Loop Borehole Systems.

CHAPTER 48

GROUND HEAT EXCHANGER (GHEX) LOOP BOREHOLE SYSTEMS

567—48.1(455B) Purpose. The purpose of this chapter is to protect the public health by protecting groundwater supplies from contamination by establishing uniform minimum standards and methods for GHEX borehole

installations (also known as ground-coupled, closed-loop, heat exchange borehole installations or geothermal loop boreholes).

567—48.2(455B) Definitions.

“Abandoned closed-loop heat exchanger” means a GHEX loop which no longer circulates heat exchange fluid or which has limited use or access.

“Abandoned well” means a well whose use has been permanently discontinued. A well shall be considered abandoned when its condition is such that continued use is impractical or no longer desired.

“Administrative authority” means the county board of health or the county board of health’s designee.

“Anaerobic lagoon” means an impoundment, the primary function of which is to store and stabilize organic wastes. The impoundment is designed to receive wastes on a regular basis, and the design waste loading rates are such that the predominant biological activity in the impoundment will be anaerobic.

An anaerobic lagoon does not include:

1. A runoff control basin which collects and stores only precipitation-induced runoff from an open feedlot feeding operation; or
2. A waste slurry storage basin which receives waste discharges from confinement feeding operations and which is designed for complete removal of accumulated wastes from the basin at least semiannually; or
3. Any anaerobic treatment system which includes collection and treatment facilities for all offgases.

“Annular space” means the open space between the borehole excavation and the well casing and/or the borehole heat exchanger.

“Backflow prevention device” means any device, method or type of construction to prevent backflow of water, liquids, mixtures, or substances into a well or into the distribution pipes of a potable supply of water from any source other than its intended source.

“Borehole” means any excavation greater than 20 feet in depth that is drilled, cored driven, dug, bored, augered, jetted, washed, trenched, excavated, or otherwise constructed and contains: a) no casing or well liner pipe, or, b) contains a well casing or liner pipe that is temporary and that will be extracted upon completion of the well bore and the insertion of the closed loop heat exchanger loop.

“Cesspool” means a covered excavation, lined or unlined, into which wastes from toilets or urinals

are discharged for disposal. Cesspools are not an approved method of sewage disposal.

“Closed loop” means that the recirculated, heat-exchange fluid is contained within the piping in order to exchange heat, not water, with the ground. The heat-exchange fluid is not exposed to the atmosphere.

“Department” means the Iowa Department of Natural Resources.

“Earthen manure storage basin” means an earthen cavity, either covered or uncovered, which, on a regular basis, receives waste discharges from a confinement feeding operation if accumulated wastes from the basin are completely removed at least once each year.

“Flowing borehole” means a borehole that discharges groundwater at or above the land surface without the benefit of a pump.

“Formed manure storage structure” means a structure, either covered or uncovered, used to store manure from a confinement feeding operation, which has walls and a floor constructed of concrete, concrete block, wood, steel, or similar materials. Similar materials may include, but are not limited to, plastic, rubber, fiberglass, or other synthetic materials. Materials used in a formed manure storage structure shall have the structural integrity to withstand expected internal and external load pressures.

“GHEX” means ground heat exchange

“GHEX” loop boreholes means ground heat exchange borehole(s) or ground-coupled, closed-loop, heat exchange borehole(s) or any excavation greater than 20 feet in depth that is drilled, cored, driven, dug, bored, augered, jetted, washed or is otherwise constructed into which a closed loop used for ground heat exchange is installed. A GHEX loop borehole is not a water supply well.

“GHEX systems” means the various components of the ground heat exchange systems including the borehole, piping, grout, and heat-exchange fluid.

“GHEX borehole construction” means the excavation of the borehole, emplacement of the closed loop, grouting of the loop, and installation of the heat exchange fluid.

“GHEX borehole driller” means well contractor who is certified by the department to install GHEX borehole systems.

“Grout” means an NSF-approved, natural bentonite based material suitable for geothermal or water well use that is used to seal the annular space between the GHEX loop piping and the borehole and shall consist of 16.67% (minimum) solids bentonite slurry, thermally-enhanced bentonite grout, or neat cement with no more than 6 gallons

of water per 94 pound sack of Portland cement and no more than 6% bentonite calculated by dry weight. Grout must be heavier than the drilling fluids. Drilling chips, drilling mud or heavy drilling fluids are not grout.

“Heavy drilling fluid” means water used for drilling which because of the natural clay content of the borehole or by addition of bentonite has a solids density of at least 10 percent by weight or a mud weight of at least 9.25 lb/gal.

“Heat transfer fluids” are the department approved solutions that are used inside the piping installed in GHEX systems which are used to exchange the heat with the earth.

“Local administrative authority” means the local board of health or its designee authorized to issue GHEX construction permits pursuant to this chapter.

“Low permeability material” means a geological unit of unconsolidated material (usually clay or till) or bedrock (usually shale) that is all or partially saturated, and having permeability low enough (10^{-7} cm/sec) to give water in the aquifer artesian head.

“Nonpublic water supply well” means a water supply well which is not used as part of a public water supply system. Also known as a “private water supply well.”

“Open feedlot” means an unroofed or partially roofed animal feeding operation in which no crop, vegetation, or forage growth or residue cover is maintained during the period that animals are confined in the operation.

“Open loop” means a heat-exchange system that does not contain the heat-exchange fluid in a closed loop. These systems pump water and then discharge it.

“Public water supply well” means a water supply well which is used a part of a public water supply system.

“Runoff control basin” means an impoundment designed and operated to collect and store runoff from an open feedlot.

“Structures” are defined as buildings, cultural features, and wells of any kind, excepting other ground-coupled, closed-loop heat-exchange boreholes in the same system.

“Well” means any excavation that is drilled, cored, driven, dug, bored, augered, jetted, washed or is otherwise constructed for the purpose of exploring for groundwater, monitoring groundwater, extracting water from or injecting water into the aquifer.

“Well” does not include an open ditch, drain tiles, an excavation made for obtaining or prospecting for

oil, natural gas, minerals, or products mined or quarried, lateral heat exchange systems less than 20 feet deep, nor temporary dewatering wells such as those used during the construction of subsurface facilities only for the duration of the construction.

“Well plugging” means the closure of an abandoned well with plugging materials by procedures which will permanently seal the well from contamination by surface drainage and permanently seal off the well from contamination into an aquifer. “Well plugging” includes the proper application of filling and sealing material.

567—48.3(455B) Applicability. The provisions contained herein apply to all GHEX loop boreholes constructed for the purpose of utilizing the heat-exchange properties of the ground or groundwater. They shall apply to all GHEX loop borehole systems constructed 20 feet or greater in depth. They shall also apply to both residential and commercial installations. These rules do not apply to surface water GHEX systems, trench installations less than 20 feet in depth, or other types of GHEX installations less than 20 feet deep. All GHEX pump and dump well systems, GHEX pump and re-inject well systems, GHEX standing column heat-exchange well systems or any other installations which meet the definition of “well” but are not GHEX loop boreholes are regulated by the construction rules as found in IAC – 567 Chapter 49.

48.3(1) Nonconforming GHEX installations. Any GHEX loop borehole systems which are not constructed in a manner that complies with all of the provisions within this chapter are nonconforming. Any nonconforming GHEX loop borehole installation feature shall be modified to meet the requirements of this chapter or shall be properly abandoned.

567—48.4(455B) General. The administrative authority shall have the authority to visit GHEX loop borehole construction sites during any phase of the construction without prior notice. The administrative authority shall by rule require the issuance of permits and the submission of GHEX borehole geologic logs. No GHEX loop borehole shall be initiated until a state and any required local well construction permits have ~~has~~ been issued by the proper permitting authorities complying with IAC 567 –Chapter 38. All GHEX loop borehole construction shall be performed by a certified GHEX borehole driller or by the property owner as specified in IAC 567—Chapter 82. The administrative authority may also require increased site assessment, posting of performance bonds and collection and submission of drill cutting samples, hydro-geological data, and other pertinent information regarding the

proposed or actual installation. It shall be the responsibility of the certified GHEX borehole driller to ensure that all state and local GHEX loop borehole construction permits have been issued prior to initiation of GHEX loop borehole construction. It shall also be the responsibility of the certified GHEX borehole driller to ensure that all GHEX loop borehole construction is performed in accordance with the provisions of this chapter.

567—48.5(455B) Variances. Variances from the construction standards found in these rules can only be issued by the department. Local permitting agencies can not issues variances from these rules. Any permittee who requests a variance must follow the guidelines as found in 567 Iowa Administrative Code Chapter 10 and submit the request and support documentation in written form to the department. The support documentation must include detailed information regarding the proposed additional standards or protections that will be used during the installation of the GHEX loop boreholes that will provide protection equal to or greater than the rules as written. The department will provide a written document to the permittee with information regarding variance approval or rejection. The conditions set by any variance request and any variance approval shall be noted on the GHEX loop borehole construction permit as issued on the department’s Private Well Tracking System (PWTS.)

567—48.6(455B) Location of GHEX boreholes. The GHEX borehole driller shall consult the administrative authority for assistance in determining a proper distance in such cases where potential hazards to groundwater are not listed in Table 6(1) or Table 6(2).

48.6(1) Minimum distances. Any GHEX borehole with properly placed full-length grout should not be an avenue for fluid migration. The borehole, therefore, can be placed reasonably close to other structures. Some native, undisturbed material should remain between the GHEX borehole and any other existing or future structure. The following minimum lateral distances shall apply for the common sources of contamination listed in the following tables:

Table 48.6(1)”a” Minimum lateral separation distances for **vertical** GHEX boreholes

<u>Public water supply wells defined as “shallow well”</u>	<u>400 feet</u>
<u>Public water supply wells defined as “deep well”</u>	<u>200 feet</u>

<u>Sanitary landfills.....</u>	<u>500 feet</u>
<u>Earthen manure storage basins; livestock runoff control basins; anaerobic lagoons</u>	<u>400 feet</u>
<u>Domestic wastewater lagoons.....</u>	<u>200 feet</u>
<u>Industrial wastewater lagoons and basins.....</u>	<u>200 feet</u>
<u>Non-conforming private water well completed in the same aquifer which will be intersected by the GHEX</u> <u>borehole.....</u>	<u>50 feet</u>
<u>Non-conforming private water well that is not completed in an aquifer which will be intersected by the GHEX</u> <u>borehole.....</u>	<u>25 feet</u>
<u>Conforming private water well completed in the same aquifer which will be intersected by the GHEX</u> <u>borehole.....</u>	<u>25 feet</u>
<u>Conforming private water well where the GHEX borehole will not intersect the same aquifer in which the</u> <u>conforming well is completed.....</u>	<u>10 feet</u>
<u>Preparation or storage area for spray materials, commercial fertilizers or chemicals that may result in groundwater</u> <u>contamination.....</u>	<u>100 feet</u>
<u>Formed manure storage structures; confinement buildings; feedlot settling facilities; open feedlots; soil absorption</u> <u>fields; any sewage treatment system with an open discharge; pit privy or septic tank discharge line; sewers under</u> <u>pressure... ..</u>	<u>50 feet</u>
<u>Septic tank, concrete vault privy, sewer of tightly joined tile or equivalent material, or sewer-connected foundation</u> <u>drain;</u>	<u>25 feet</u>
<u>Above ground liquid hydrocarbon storage tanks.....</u>	<u>25 feet</u>
<u>Below ground liquid hydrocarbon storage tanks.....</u>	<u>100 feet</u>
<u>Road ditches, right-of-ways</u>	<u>10 feet</u>
<u>Streams, ponds, or lakes.....</u>	<u>25 feet</u>

<u>Sewer of cast iron with leaded or mechanical joints; sewer of plastic pipe with glued or compression joints; independent clear water drains; cisterns; well pits; pump house floor drains; hydrants; frost pits; sewer collector pits and lift stations.....</u>	<u>10 feet</u>
<u>Structures (buildings, cultural features).....</u>	<u>5 feet</u>
<u>Property lines (unless a mutual easement is signed and recorded by both parties).....</u>	<u>4 feet</u>

Table 48.6(1) "b" Minimum **VERTICAL** separation distances between horizontal and directional bored of GHEX boreholes and sources of contamination

<u>Homes, basements, garages, and other building structures that do not pose a contamination threat</u>	<u>5 feet</u>
<u>Commercial buildings, buildings warehousing potentially hazardous substances, areas where past or present activity may have contaminated the soils - Consult with the department for appropriate separation distance.</u>	
<u>Manure storage structures; confinement buildings; feedlot settling facilities; open feedlots; earthen manure storage basins; livestock runoff control basins; anaerobic lagoons; domestic wastewater lagoons; industrial wastewater lagoons or basins, preparation or storage area for spray materials, commercial fertilizers or chemicals that may result in groundwater contamination; liquid hydrocarbon storage tanks.....</u>	<u>15 feet</u>
<u>Private soil absorption fields; any sewage treatment system with an open discharge; pit privy or septic tank discharge line; septic tank, concrete vault privy; sewer of tightly joined tile or equivalent material; sewer-connected foundation drain; sewers under pressure; liquid hydrocarbon storage.....</u>	<u>5 feet</u>

48.6(2) Response to contamination. The GHEX borehole driller should contact the department to determine if the GHEX construction will impact known areas of contamination. The department has the right to modify the construction requirements for the loop boreholes, stop the construction until the additional information is collected,

or rescind the construction permit based upon actual site conditions found at the time of GHEX borehole installation.

48.6(3) Easements. GHEX boreholes shall not be located on property that is not owned by the user of the GHEX system unless an easement allowing such placement is agreed upon by the property owners, reviewed and approved by the administrative authority, and the easement is legally recorded.

567—48.7(455B) General construction requirements. To minimize the potential contamination of the groundwater, GHEX borehole(s) shall be planned and constructed to adapt to the geologic conditions of the proposed GHEX borehole site to ensure utilization of every natural protection against contamination of any water-bearing formation(s) and the exclusion of sources of contamination to groundwater.

48.7(1) Pre-drilling water well survey. It will be the responsibility of the property owner, or an agent identified by the property owner, to conduct a pre-construction water well survey. The pre-construction water well survey will identify, list, and plot, on a topographic map or aerial photograph, all known private and public water wells within a 250-foot radius of the proposed GHEX construction site property boundaries. This map and a well log for the first GHEX borehole, or exploration borehole, and all directional boreholes are required for each site. The intent of the water well survey is to find and locate actual wells, or receptors, to the uppermost aquifers, particularly those wells completed in the same zone as the proposed GHEX borehole.

a. The applicant will submit the pre-construction water well survey to the regulatory authority in order to document minimum separation distances between water wells and the GHEX boreholes.

b. The applicant will also submit to the regulatory authority and the Iowa Geological Survey the well log for the first vertical GHEX borehole, or exploration borehole, and the logs for all horizontal/directional boreholes for each site. Additional wells logs for vertical boreholes are required if there is a significant change in the geological formations or if sensitive geological conditions exist that may result in long term grout failure and/or groundwater contamination.

c. The department may require additional borehole log information when the proposed GHEX loop borehole field is located in any area that may contain one or more sources of contamination or for locations that are

geologically sensitive. This information shall include all of the normal well log information and also include, but not limited to the following additional information: detailed information about any contamination observed during the drilling process, detailed information on the production of water or loss of water from the borehole during borehole construction, depths at which any fractures, voids, ~~or~~ caverns or other significant geologic features occur, static water level of any groundwater encountered upon the completion of drilling and prior to grouting, detailed information on each loop heat exchanger that does not easily and fully enter the borehole, detailed borehole backfilling and grouting information including the actual amount of grout and sand utilized and consumed by the borehole construction, and any other information required to successfully install loop heat exchangers that provide long term protections for ~~of~~ the groundwater. All information obtained or developed to fulfill this requirement shall also be provided as addendums for any specification developed for GHEX borehole drilling when the borehole project involves competitive bidding.

48.7(2) *Water used in construction.* Water used in the construction process shall be obtained from a potable water source that will not result in contamination of the groundwater. Water used for drilling shall be treated with 3 pints of 5.25 percent sodium hypochlorite solution per 100 gallons of water or 0.25 pounds of 65 percent calcium hypochlorite per 100 gallons of water to produce an equivalent concentration of chlorine residual of 50 mg/L.

48.7(3) *Closed loop installation.* Closed loops shall be installed in the GHEX borehole as soon as possible after drilling. All GHEX closed loop boreholes shall have the heat exchanger piping installed and the borehole fully grouted within 24 hours of borehole completion. The annular space between the GHEX piping and the borehole must be full-length grouted using a tremie pipe through pumped pressure method from the bottom of the borehole upwards using an approved grout as required in subrule 48.7(5). Any confining layers between major or minor bedrock aquifers shall be subject to additional requirements as defined in subrule 48.8(4).

48.7(4) *Temporary borehole protection.* Any borehole that is not immediately completed and grouted shall be covered to protect the borehole from surface water, contaminants and foreign objects entering the borehole and the groundwater.

48.7(5) *Borehole grouting.* All GHEX loop boreholes must be fully grouted from the bottom of the borehole upwards in one continuous motion with the exception of those boreholes detailed in 48.7(1)c where the grouting

must be done according to an approved standard developed by the installation of test holes, and 48.8(4) where the grouting must allow for filling of subsurface fractures, caverns, or caves.

a. Grout. All bentonite grouts must be an NSF-approved natural bentonite material consisting of 16.67% minimum solids and designated and labeled as a grout for GHEX or water well use. Drilling mud can not be used as grout. Grout must be heavier than the drilling mud to minimize the risk of grout channeling. Where natural groundwater chemistry has a total hardness greater than or equal to 500 ppm and/or a chloride content of greater than or equal to 1500 ppm, bentonite-based grouts may not be appropriate; in these situations un-beneficiated sodium bentonite with cement is an appropriate grout mixture, and the cement-based grout must have a low permeability (10^{-7} cm/sec). Any grout subsidence found at the time the upper terminus of the GHEX loop boreholes are excavated and connected to the header pipes must be corrected by the addition of grout material to the borehole until the grout is level with the trench floor.

(1) *Thermally-enhanced grouts.* Thermally-enhanced grouts must be mixed to manufacturer's published specifications to achieve permeability of 10^{-7} cm/sec or less and to achieve uniform mixture of any sand or additives. The department may approve other grouts which have a low permeability (10^{-7} cm/sec). Experimental grouts and grout additives must be approved by the department before use in GHEX installations.

(2) *Cementaceous grouts.* Neat cement and sand cement grouts may be used as long as they are appropriately mixed to industry standard ratios and are placed using full depth pressure grouting through a tremie pipe.

(3) *Alternative grout products.* Grouts that contain additives other than bentonite, sand and cement must be approved by the department before placement will be allowed into a GHEX borehole.

b. Weights. Weights, ballast, and attachments used to facilitate the emplacement of the closed loop, hardware, and appurtenances which will remain in the borehole must be composed of materials approved as safe in water well construction. Lead weights, ballast, or hardware are prohibited.

c. Identification of boreholes. - Each GHEX borehole shall be permanently identified and located to within three feet by a means or method approved by the department and the method of identification and borehole placement documented on the borehole log form. Approved methods include magnetic tape, magnetic wire, survey pins, high resolution GPS, or other methods approved by the department which will allow the buried GHEX borehole to be remotely detectable, or the borehole field(s) shall have the final borehole perimeter(s) identified by high resolution GPS and the locations recorded on borehole log form..

48.7(6) Vertical and horizontal heat exchanger piping. The vertical and horizontal piping installed in a GHEX borehole shall conform with the following:

a. Piping used must be high-density polyethylene manufactured from new, non-recycled high-density polyethylene (HDPE), meet the specifications and material designation of PE 3408 or greater, and manufactured for “GHEX or geothermal” applications.

b. The heat exchanger pipe shall have:

(1) Factory-fused U-bend, and

(2) A Dimension Ratio (DR) of 11 having a working pressure rated for at least 160 _____ psi or a DR of 9 having a working pressure rated for at least 200 psi.

(3) Field connections, field repairs and modifications that follow manufacturers’ written instructions for application, testing, protection and use, and be performed by individuals who have completed the pipe manufacturers training for product handling and fusion methods.

c. Any pipe installed within the GHEX borehole shall have the upper terminus open pipe ends sealed to prevent dirt and debris from entering the pipe. Approved methods include pipe plugs and heat sealing through crimping or by coupling the pipe via heat fusion method. Under no circumstances shall the loop pipe be sealed using only tape products.

48.7(7) Outdoor horizontal header and connector piping. The horizontal piping installed for use in GHEX system shall conform to the following horizontal piping standard:

a. Horizontal piping must be high-density polyethylene manufactured from new, non-recycled high-density polyethylene (HDPE), meet the specifications and material designation of PE 3408 or greater, and manufactured for “GHEX or geothermal” applications.

b. Have a Dimension Ratio (DR) of 11 having a working pressure rated for at least 160 _____ psi or a DR of 9 having a working pressure rated for at least 200 psi.

c. Buried field connections, connection repairs and piping modifications of horizontal subsurface pipe shall be heat fused by butt, socket, sidewall or electro-fusion methods in accordance with the pipe and pipe fitting manufacturer’s procedures and standards, and be performed by individuals who have completed the pipe

manufacturers training for product handling and fusion methods. Stab fittings or other types of mechanical connections may only be used if the subsurface location is accessible as in interior vault connections.

d. Any pipe installed and not immediately connected to other system piping shall have the piping ends sealed to prevent dirt and debris from entering the pipe. Approved methods include pipe plugs and heat sealing through crimping. Under no circumstances shall the loop pipe be sealed using only tape products.

48.7(8) Fittings. The material used in the manufacture of the fittings shall be the same base resin material as the connecting closed loop pipe. Closed loop pipe fittings buried below grade shall be molded and manufactured to the specifications and requirements of ASTM D-2683 for socket fittings, ASTM D-3261 for butt-welded fittings, ASTM F-1055 for electrofusion fittings. Mechanical and barbed fittings may not be used buried below grade unless within a vault or other accessible location.

48.7(9) Joints. Joints for the pipe and fittings shall be heat fusion or electrofusion fittings. Heat fusion joints shall be assembled in accordance with the manufacturer's recommended fusion-joining procedures. Electro fusion and mechanical joints shall be assembled in accordance with the fittings' manufacturer's instructions and be performed by individuals who have completed the pipe manufacturers training for product handling and fusion methods.

48.7(10) Pressure testing. Only leak-free piping may be placed in operation within the borehole and the horizontal piping installation. For vertical piping, the pressure-test must be completed before the loop is installed into a GHEX borehole. For horizontal piping, the pressure test shall be completed before the horizontal trench is backfilled. The testing shall be completed using compressed air or potable water at a pressure of 75 psi or 1.5 times the system operating pressure, whichever is greater, for a minimum of 30 minutes. A successful pressure test demonstrates that there is no leakage. After the GHEX piping system has been completed, all system piping must be pressure-tested with air or potable water for 30 minutes minimum at a pressure of 75 psi or 1.5 times the system operating pressure, whichever is greater. If a pressure change indicates that the system has a leak, the leak shall be found and repaired before the system is placed in operation.

48.7(11) Trench pipe bedding. Horizontal piping shall include firm, stable, uniform bedding placed under the pipe for continuous support. The pipe bedding shall ensure that the pipe will not be damaged by trench backfill operations, by trench settling, or by system operation.

a. Where rock is encountered in trenching, it shall be removed to a depth of not less than 6 inches below the bottom of the pipe and bedding shall be added as required under 48.7(11) b. The pipe shall not rest on rock at any point, including joints.

b. Where trenches are excavated to depths below the bottom of the pipe, bedding shall be added beneath the pipe as required. Such bedding shall be of clean sand, gravel, or similar select material that is compacted sufficiently to provide the support required.

c. When the piping is placed in the trench, care shall be used to ensure that the trench bottom is smooth and free from sharp or angular objects. Care shall be used when transitioning piping through a bend or corner to ensure that the pipe does not fold or kink. In corners where the trench sidewall will come in contact with the piping, the sidewall shall be contoured to allow a smooth, supported radius for the pipe.

d. The Initial backfill shall embed the pipe with a minimum of four-inches (4") on each side and include a minimum of four-inch (4") cover, and shall be clean native granular materials. Embedment soils must be free from refuse, organic material, cobble, boulders, large rocks or stones, and frozen clods that may damage the structural integrity of the pipe or the connections. Flowable fill materials may be used as long as the material(s) meet the requirements of this rule.

e. An insulated copper tracer wire or other approved tracer product or conductor shall be installed adjacent to all subsurface horizontal GHEX piping to facilitate discovery of the buried piping. One end shall be brought above ground inside or outside the building or vault wall. The tracer wire shall not be less than 18 AWG insulated. The insulation of the tracer wire shall not be yellow in color.

f. The trench shall be backfilled from the top of the compacted initial backfill to finish grade using suitable material. Compacting equipment may be used for the final backfill to minimize settling.

48.7(12) Heat transfer fluids. All heat transfer fluids used in GEOHEX systems must be food-grade, USP-grade, or approved for incidental food contact applications by NSF. Fluids that meet USDA guidelines as “generally accepted as safe” may be used with department approval. Additives used for treatment of heat transfer fluids must be NSF approved for drinking water applications or meet USDA guidelines as “generally accepted as safe.” Additives shall be mixed only in concentrations recommended by the manufacturer. A permanent sign must be attached to the

injection point(s) specifying what heat transfer fluid the system currently contains and that only approved heat transfer fluids may be used in the system.

567—48.8(455B) GHEX borehole construction criteria for different geological conditions.

48.8(1) *Installation of closed loop heat exchange boreholes in difficult geological settings.* In areas of the state where contamination may be an issue and/or where geological features may exist that require additional GHEX loop field design considerations, borehole construction considerations, and/or borehole stabilization and grouting considerations, the GHEX loop boreholes shall be installed with increased oversight from the department and/or the local permitting authority. The department may require the collection of additional information on contaminated sites, local geological features, and test borehole logs and cutting samples before construction permitting is approved and the GHEX loop field production drilling initiated. In addition, the department may place conditions on the GHEX borehole construction including but not limited to, contaminated groundwater study, hydrogeological study, borehole field location study, limitations on maximum borehole depth, additional grouting requirements, and any other construction related enhancements necessary to ensure borehole integrity, system operation, and aquifer protections. All additional information as required by the department and all information assembled as part of 48.7(1) shall be provided as addendums for any specification developed for GHEX borehole drilling when the project involves competitive bidding. The approximate location and the description of the known difficult geological settings can be found in the Iowa DNR document “GHEX Loop Drilling in Difficult Geological Settings” 542-0000.

48.8(2) *GHEX boreholes constructed in unconsolidated materials.* Water-saturated, fine-grained earth materials (e.g., loess, sand, sandstone) may tend to flow during drilling and create large voids. Borehole stability will be the goal of the driller, and there may be innovative ways to accomplish stability including the use of traditional water well construction tools such as casing, liner, gravel-pack, fill, and various grouting media and methods. Techniques used to stabilize the borehole will be allowed if the stabilization technique uses clean, non-organic, native materials, bentonite or cementitious products and the products used does not allow the movement of groundwater out of the aquifer via the borehole.

48.8(3) *GHEX boreholes drilled in glacial-till dominated terrains may encounter several aquifers or water-bearing zones (i.e., loess/till contact, till/bedrock contact, interbedded sand and gravel units, basal glacial drift sand and*

gravel units). Care shall be used in placement of the borehole grout to protect any local aquifers from any vertical movement of grout and/or groundwater.

48.8(4) GHEX boreholes constructed in bedrock. Numerous areas of Iowa are underlain by bedrock geology that can include highly porous zones, cavernous or fractured areas within the bedrock, or other features associated with the bedrock that cause borehole stabilization, water production, grout loss issues, and interference with existing boreholes and water wells. Extreme care must be used to ensure the stability and effectiveness of the grout materials within the borehole. Borehole stabilization techniques shall not allow the migration of stabilizing material (especially bentonite, sand, ag-lime, or other materials that tend to “flow”) to any well. Hole stability utilizing rock chips, sand, ag-lime, cement, bentonite, and other traditional water well construction materials is allowed. However, since individual boreholes can encounter more than one such porous zone, it is required that each porous zone be stabilized separately, and each section of borehole between the porous zones be full-length grouted to prevent groundwater from migrating along the borehole from one porous zone to another. When a borehole encounters fractures and/or voids that may result in grout instability and subsidence, the well driller shall follow the requirements:

a. Small fractures. Small fractures can be filled by using dense bentonite grout, cementitious grouts, or with chipped bentonite plugging material as long the material used will allow the borehole grout column to remain stable.

b. Large fractures and voids. Large fractures and voids may be filled with clean fill (gravel, pea stone, limestone chips, bentonite chips) as long as care is used to place the fill material to ensure that it does not bridge in the borehole and that the grout placed above the fractures and/or voids remains stable. Under no circumstances shall the borehole be filled entirely of clean fill material. Grout must always be used in the areas of the borehole that do not include large fractures or voids.

c. Areas of extreme borehole instability. In areas where the borehole is so unstable that the loop can not be successfully placed to full depth or where the borehole will not allow the grout column to remain in place, the well driller shall utilize a well casing to stabilize the borehole. Any permanent casing must be properly grouted between the outside of the casing and the borehole wall to eliminate any vertical pathway that allows groundwater or grout to migrate into the unstable area.

48.8(5) Abandonment of borehole because of instability. If a borehole cannot be utilized because of any bedrock instability, the borehole must be properly plugged as stated in 48.10.

48.8(6) *Flowing boreholes.* Boreholes that encounter permeable formations which result in groundwater movement from any given zone within the borehole must be stabilized to prevent the vertical movement of groundwater. This movement can be either upward or downward and includes flowing onto the ground surface. The type of grout used, the density of the grout prepared, and the method used for grout placement shall ensure that the grout will confine each zone and not wash away by groundwater under pressure.

48.8(7) *Interconnection of aquifers.* GHEX boreholes shall not penetrate a confining unit which separates major bedrock aquifers. When a major bedrock aquifer is utilized, the confining layer below must not be penetrated. The following major bedrock aquifers shall not be interconnected by a GHEX borehole:

- Cretaceous Dakota Formation.
- Mississippian System.
- Silurian-Devonian Systems.
- Ordovician System above the St. Peter Sandstone (Galena aquifer, Maquoketa Formation).
- Cambrian-Ordovician Systems – St. Peter Sandstone through the St. Lawrence Formation (Jordan aquifer).
- “Dresbach” aquifer – Galesville Member, Eau Claire Formation, and Mt. Simon Formation.

Information regarding bedrock aquifers can be found in “Iowa’s Groundwater Basics” as published by the Iowa Department of Natural Resources (Iowa Geological and Water Survey Educational Series 6), or by contacting the Iowa Geological and Water Survey

a. Minor confining units. Confining units within and between minor bedrock aquifers must be restored to ensure the integrity of the confining unit. Proper grouting of the confining bed shall take into consideration the porosity and permeability of the bedrock aquifers and use of a grout product that will minimize the possibility of grout migration and subsidence.

b. Exploration borehole. The first exploration borehole may be drilled to any depth to determine the thermal conductivity of the earth materials. If, however, the exploration borehole is to be used as a GHEX borehole, then any confining unit between major bedrock aquifers, which was breached by the drilling of this exploration borehole, must be sealed with grout – and the grout allowed sufficient time to achieve set and stability – before the installation of the heat exchange closed loop above the confining unit. The base of the GHEX loop must be at least 10 feet above the top of the confining layer. Subsequent GHEX boreholes in the same borehole field shall also terminate at

least 10 feet above the top of the confining unit. The top of the confining unit is determined by the exploration borehole and any subsequent boreholes which encounter the same or equivalent geologic unit.

567—48.9 (455B) Disposal of drilling wastewater. Drilling fluid, drilling mud, drill cuttings and drill site wastewater generated during the construction of GHEX installations shall be properly disposed of at the time of construction.

48.9(1) Drilling fluids or drill cuttings shall not be disposed of in a stream or storm sewer nor shall these materials be discharged into a sanitary sewer without permission of the owner and operator of the wastewater treatment facility.

48.9(2) All GHEX borehole construction related wastewater that reaches Waters of the United States is subject to the management requirements for well construction related wastewater found in 567 IAC Chapter 64 and General Permit #6 (GP6.) GP6 requires notification to the Iowa DNR Field Services Office in the region where the construction is taking place, the development of an adequate well water pollution prevention plan, placement of adequate best management practices (BMPs) for wastewater treatment, periodic inspection of the BMPs, and documentation of compliance.

48.9(3) Reasonable care should be used so that GHEX borehole related wastewater does not create a nuisance to adjoining property owners.

567—48.10(455B) Abandonment and plugging of GHEX boreholes. Any GHEX borehole(s) that will not be used for the purpose intended must be properly plugged so that the abandoned boreholes do not become a potential contamination hazard to nearby drinking water wells or the groundwater. Proper plugging will be dependent on the individual borehole.

48.10(1) *Borehole with closed loop pipe contained within the borehole.* If the GHEX borehole was completed and conforming to this chapter and there are closed loop pipe(s) still within the borehole, the closed loop pipe(s) shall be disconnected from the header pipe if connection exists and each closed loop pipe shall be pressure grouted with approved grout. The heat transfer fluids displaced by the grouting of the closed loop pipe(s) shall be contained and disposed of properly. Any grout subsidence found during loop borehole excavation shall be replaced with grout.

48.10(2) Any GHEX borehole that does not contain closed loop pipe shall be plugged using the appropriate Class II well plugging requirements as found in 567 IAC Chapter 39.8(6).

567—48.11(455B) GHEX system related devices.

48.11(1) Flow measurement device. All GHEX systems shall include a flow measurement device that is placed in a readily accessible location.

49.11(2) Water make-up lines. All water make-up lines connected to a GHEX loop borehole system must be protected with an approved backflow prevention device.

567—48.12(455B) Waste disposal prohibition. Under no circumstances shall any GHEX test holes, boreholes, or heat exchanger installation be used for the disposal of debris, solid waste, septic tank sludge or effluents, or any other type of unauthorized disposal of waste materials, or as a receptacle for field tile drainage or other surface water sources.

Amendments to 567—Iowa Administrative Code Chapter 38

Item 2. Amend the following definition in 38.1:

“*Construction*” means the physical act or process of making a water well or GHEX loop borehole including, but not limited to, siting, excavation, construction and installation of equipment and materials necessary to maintain and operate the well or the ground-coupled heat exchanger portion of a GHEX loop borehole system.

Item 3. Adopt the following **new** definition in 38.1:

“*GHEX loop borehole*” means ground heat exchange loop borehole(s) or ground-coupled, closed-loop, heat exchange borehole(s) or geothermal boreholes, or any excavation greater than 20 feet in depth that is drilled, cored, driven, dug, bored, augered, jetted, washed or is otherwise constructed into which a closed loop used for a ground heat exchange system is installed.

Item 4. Amend rule 38.2 as follows:

567—38.2(455B) Forms. The following application form is currently in use: Application for Private Water Well Construction Permit. ~~42/98~~ 542-0988

Item 5. Amend subrule 38.3(1) as follows:

38.3(1) *When permit required.* A landowner or landowner's agent shall not drill or construct a new private water well or construct GHEX loop borehole(s) without first obtaining a well construction permit issued by the department or by a county board of supervisors or the board's designee authorized to issue permits pursuant to this chapter. Examples of private water wells requiring well construction permits include, but are not limited to: domestic wells, livestock wells, irrigation wells, recreational-use wells, monitoring wells, heat pump supply wells or GHEX heat pump loop boreholes, industrial wells, and dewatering wells, except that dewatering wells shall be exempt from the construction standards of 567—Chapter 49 (nonpublic water wells).

Item 6. Amend rule 38.4 as follows:

567—38.4(455B) Form of application. Application shall be made on forms supplied by the department. However, counties that have active delegation of authority to issue new private well construction permits pursuant to rule 38.15(455B) may develop and use their own application forms subject to the approval of the department. Each application shall list all wells, including nonplugged abandoned wells, on the applicant's property contiguous to the well site described in the application and shall describe the location of each well site. The location shall be given in the form of a legal land description (section, township and range) to the nearest quarter of a quarter of a quarter of a section, or as a latitude and longitude in degrees to four decimal accuracy. The list of wells to be registered shall include but is not limited to abandoned wells, inactive wells, agricultural drainage wells, irrigation wells, domestic wells and livestock wells. GHEX loop borehole well applications shall also include a pre-drilling water well survey as noted 567—Iowa Administrative Code Chapter 48.7(1).

Item 7. Amend rule 38.10 as follows:

567—38.10(455B) Expiration of a permit. A private well construction permit shall expire one calendar year from the date of issuance. If construction of the proposed well is not started prior to the expiration date, a new application plus a new nonrefundable fee must be filed with the department or the local county permitting authority ~~county board of supervisors~~ pursuant to rule 38.15(455B).

Item 8. Amend rule 38.12 as follows:

567—38.12(455B) Denial of a permit. The department or contracting county may deny a private well construction permit if granting the permit would lead to the violation of state law, could result in groundwater contamination, would lead to withdrawal from a protected source, or the well could threaten public health or the environment. Examples of wells that could threaten public health or the environment and, therefore, may be denied construction permits include, but are not limited to: in situ mining wells, wells which may result in a negative impact on an identified point source of groundwater contamination and cause leachate plume to spread or migrate, underground injection wells except as provided in 567—subrule 50.6(4) and 567—62.9(455B) and GHEX loop borehole fields located in or nearby contaminated sites or in geologically sensitive areas.

Item 9. Amend rule 39.3 Definitions.

Adopt the following **new** definition.

“GHEX loop borehole” means ground heat exchange loop borehole(s) or ground-coupled, closed-loop, heat exchange borehole(s) or geothermal boreholes, or any excavation greater than 20 feet in depth that is drilled, cored, driven, dug, bored, augered, jetted, washed or is otherwise constructed into which a closed loop used for a ground heat exchange system is installed.

Item 10. Adopt the **new** subrule as follows:

39.8(6) GHEX loop boreholes. *Any GHEX loop borehole that can not be used as a heat exchanger and that does not contain any piping shall be plugged using the appropriate 39.8(4) “Class 2” plugging requirements that match the actual geology encountered during drilling operations. All GHEX loop boreholes that contain heat exchanger piping shall be plugged following the requirements for the plugging of GHEX loop boreholes found in 567—Iowa Administrative Code Chapter 48.10(1), “Abandonment and plugging of GHEX boreholes.”*

Amendments to 567—Iowa Administrative Code Chapter 39

Item 11. Amend rule 49.2 Definitions. Adopt the following new definition:

“GHEX loop borehole” means ground heat exchange loop borehole(s) or ground-coupled, closed-loop,

heat exchange borehole(s) or geothermal boreholes, or any excavation greater than 20 feet in depth that is drilled, cored, driven, dug, bored, augered, jetted, washed or is otherwise constructed into which a closed loop used for a ground heat exchange system is installed.

Item 12. Amend rule 49.3 Applicability

567—49.3(455B) Applicability. The provisions contained herein apply to all nonpublic water supply wells constructed for the purpose of domestic, livestock, irrigation, recreation, and commercial or industrial use. They shall also apply to existing water wells undergoing reconstruction. GHEX loop borehole systems are not covered by these provisions but are regulated under 567 Iowa Administrative Code Chapter 48.

Item 13. Amend rule 49.5 as follows:

567—49.5(455B) Variances. Variances to these rules may be granted by the administrative authority if sufficient information is provided to substantiate equal protection and the need for such action. Variance requests and reasoning shall be in writing. Variance approvals or rejections shall also be in writing. Where permitting authority has not been delegated to the county, the department will review and grant or deny any variance requests within that jurisdiction. A statement of variance approval or denial and all conditions required as part of an approved variance shall be noted in the “variance” and “special conditions” areas of the private well construction permit issued on the department’s Private Well Tracking System (PWTS.)

Item 14. Amend rule 49.29 as follows:

567—49.29(455B) Closed circuit vertical heat exchangers or GHEX Loop boreholes systems.
Provisions that apply to GHEX loop boreholes and closed loop heat exchangers are found in 567—Iowa Administrative Code Chapter 48. These provisions apply to closed circuit vertical heat exchanger construction.

~~**49.29(1)** Piping used must be 160 psi pressure rated high density polyethylene or polybutylene.~~

~~**49.29(2)** Connection to piping must use socket fusion or butt fusion joining methods.~~

~~**49.29(3)** Piping must be pressure tested with air or potable water for 15 minutes at a pressure of 1.5~~

times the system operating pressure after installation in the borehole.

~~—49.29(4) The annular space between the vertical heat exchanger piping and the borehole must be grouted as required in subrule 49.9(3) using an approved grouting method and material. Grout shall be placed at least in the top 40 feet. Any confining layers between aquifers shall be replaced with grout. Grouting must be performed within 24 hours of completion of the borehole.~~

~~—49.29(5) Only food grade or USP grade propylene glycol or calcium chloride may be used as heat transfer fluid. Any other materials or additives must be NSF approved for drinking water applications. A permanent sign must be attached to the heat pump specifying that only approved heat transfer fluids may be used.~~

~~—49.29(6) A flow measurement device must be installed on each system.~~

~~—49.29(7) Water make up lines to the vertical heat exchanger must be protected with a backflow prevention device.~~

Amendments to 567—Iowa Administrative Code Chapter 82

Item 15. Amend definition of “certified well contractor” in rule 82.1 as follows:

“Certified well contractor” means a well contractor who has successfully passed an examination prescribed by the department to determine the applicant’s qualifications to perform well drilling, and or GHEX loop borehole services, and or pump services ~~or both~~.

Item 16. Adopt **new** definition in rule 82.1 as follows:

“GHEX loop borehole driller” means a person certified by the department to perform GHEX loop borehole services.

Item 17. Adopt **new** definition in rule 82.1 to as follows:

“GHEX loop borehole services” means the drilling of GHEX loop boreholes, fusion and installation of loop borehole heat exchanger piping into the borehole, placement of loop borehole filling and sealing materials and grout, and plugging unused GHEX loop boreholes and loop borehole systems.

Item 18. Amend definition of “well services” in 82.1 as follows:

“*Well services*” means ~~both~~ well drilling services or GHEX borehole drilling services or and pump services.

Item 19. Amend subrule 82.2(1) as follows:

82.2(1) *Certified well contractor requirement.* All well services shall be performed by a certified well contractor pursuant to this chapter, except that a person may perform well services on the person’s own property without being certified. A certified well contractor shall notify the department or the county prior to performing well drilling services ~~for a well services~~ or GHEX loop borehole services that ~~does~~ not have the required construction permits. A certified well contractor shall notify the department prior to drilling a well if the use of the water requires a water use allocation and the owner has not applied for or been issued a water use allocation.

Item 20. Amend subrule 82.2(2) as follows:

82.2(2) *Certified well contractor present.* A certified well contractor shall be present at the well site or the GHEX borehole site and in direct charge of the well services being performed or provided.

Item 21. Amend rule 82.3 as follows:

82.3(1) *Classifications.* There shall be three classifications of certified well contractors:

a. Certified well contractor.

(1) Well driller.

(2) GHEX borehole driller

~~(2)(3)~~ Pump installer.

b. Provisionally certified well contractor.

(1) Well driller.

(2) GHEX borehole driller

~~(2)(3)~~ Pump installer.

c. Well plugging contractor.

Item 22. Amend subrule 82.3(2) as follows:

82.3(2) *Certified well contractor.* In order to be certified as a certified well contractor, an applicant shall have met the experience requirements, successfully completed the well contractor examination for well drilling services, or GHEX borehole driller, or pump services ~~or both~~ and the general examination, has been issued a certificate by the department, and who renews ~~renewed~~ the certification in accordance with rules 82.10(455B) and 82.11(455B).

Item 23. Amend paragraph 82.3(3)“d” as follows:

d. Successfully complete, with a passing score, the general well contractor certification examination ~~for~~ and at least one of the specialty examinations for well drilling services, GHEX loop borehole services, or pump services ~~or both~~.

Item 24. Amend subrule 82.6(1) as follows:

CLASSIFICATION	EXPERIENCE
Certified Well Contractor (well driller)	Two years' employment and 2000 hours work experience in Class 1 and Class 2 well construction
<u>Certified Well Contractor (GHEX loop borehole driller)</u>	<u>Two years' employment and 2000 hours work experience in GHEX loop borehole construction or a combination of at least 1000 hours work experience in well construction and at least 1000 hours experience in loop borehole construction.</u>
Certified Well Contractor (pump installer)	Two years' employment and 1000 hours work experience in the installation, repair, and maintenance of water systems
Provisionally Certified Well Contractor	One half of the employment and experience required for full certification
Well Plugging Contractor	None

Item 25. Amend subrule 82.6(2) as follows:

82.6(2) Applicable experience review committee. The department may appoint a peer review committee to help evaluate relevant well services work experience submitted by applicants for certification. The committee should consist of three members recommended by the Iowa Water Well Association, three members of the Iowa Geothermal Association, two members recommended by the Iowa Environmental Health Association, one member recommended by the Iowa Groundwater Association and one member recommended by the Iowa Environmental Council. Committee recommendations shall be considered by the department, which shall make the final determination of eligibility.

Item 26. Amend subrule 82.7(3) as follows:

82.7(3) *Certification fees.* The certification fee for well drilling contractors and GHEX loop borehole drilling contractors shall be \$75 for each one-half year of a two-year period from the date of issuance to June 30 of the next even-numbered year. The certification fee for pump installation contractors and well plugging contractors shall be \$75 for each one-half year of the first year of certification and \$50 for each additional one-half year period to June 30 of the next even-numbered year.

Item 27. Amend subrule 82.7(6) as follows:

82.7(6) *Certification renewal fees.* The certification renewal fee for certified well drilling and certified GHEX loop borehole drilling contractors shall be \$300 for the two-year period. The certification renewal fee for pump installers and well plugging contractors shall be \$200 for the two-year period.

Item 28. Amend the paragraph 82.7(8)"b" as follows:

a. Contractors who have not earned sufficient CEUs for certification renewal and who wish to recertify within two years after expiration of their certification must retake and pass the written examination and pay a certification fee of \$1000.

b. Contractors who have earned sufficient CEUs but have not completed and submitted the required certification renewal documents and payment, and who wish to recertify within two years after expiration of their

certification, must retake and pass the written examinations and pay a certification fee of \$300 plus the actual penalty fee as noted in 82.5(5).

Item 25. Amend subrule 82.8(1) as follows:

82.8(1) *Type of examination.* There will be four examinations available:

a. A general fundamentals examination for well drilling, GHEX loop borehole drilling and pump installation contractors.

b. An examination for well drillers.

c. An examination for GHEX loop borehole drillers.

c. An examination for pump installers.

d. An examination for well plugging contractors.

Item 26. Amend subrule 82.8(2) as follows:

82.8(2) *Required examinations.* Well drilling contractors, GHEX loop borehole drilling contractors, and pump installers must take and pass the general fundamentals examination and at least one of the specialty examinations. Examinations may be taken at the same time and place or at different times. Work shall be limited to the specialty in which proficiency has been demonstrated by written examination. Well plugging contractors must take and pass the well plugging examination only.

Item 27. Amend subrule 82.8(3) as follows:

82.8(3) *Examination application.* A person wishing to take the examination required to become a certified well contractor shall complete the Well Contractor Certification Examination Application, Form 43970. ~~A listing of dates and locations of examinations is available from the department upon request.~~ The application form requires the applicant to indicate educational background, training and past experience in providing well services. The completed application and the application fee shall be sent to the director and addressed to the Iowa Department of Natural Resources, Well Contractor Certification, 401 SW 7th Street, Suite M, Des Moines, Iowa 50309. Application for examination must be received by the department at least ~~60~~ 30 days prior to the date of the examination.

Item 28. Amend subrule 82.9(2) as follows:

82.9(2) *Certification by registration without testing.*

a. A well contractor who is engaged in performing pump services on or prior to June 30, 2004, and who registers as a pump installer with the department by June 30, 2004, shall be deemed to have met the certification requirements of this chapter without examination. The experience requirement will apply. Beginning July 1, 2004, a pump installer seeking an initial well contractor certification shall meet the testing requirements for certification established in this chapter.

Item 29. Adopt **new** paragraph 82.9(2)"b" as follows:

b. A well contractor who is currently certified by the department as a well driller and who is engaged in performing GHEX loop borehole services on or prior to June 30, 2011, and who registers as a GHEX loop borehole driller with the department by June 30, 2011, shall be deemed to have met the certification requirements of this chapter without examination. The experience requirement will apply. Beginning July 1, 2011, all well contractors seeking well contractor certification as GHEX loop borehole driller shall meet the minimum experience and testing requirements for GHEX loop borehole driller certification established in this chapter.

Item 30. Amend subrule 82.11(1) as follows:

82.11(1) *CEU requirements.* Continuing education must be earned during two-year periods between April 1 and March 31 of even-numbered years. A certified well contractor holding well driller certification, GHEX loop borehole driller certification, or ~~both~~ either well driller and or GHEX loop driller certification and pump installer certifications must earn 1.6 units or 16 contact hours during each two-year period. A certified well contractor holding only pump installer certification must earn 1.0 units or 10 contact hours during each two-year period. A well plugging contractor may be required to earn 0.2 units or 2 contact hours during each two-year period as determined by the department, provided the well plugging contractor is notified of the requirement at the beginning of the renewal period. Newly certified (previously uncertified) well contractors who are certified after April 1 of even-numbered years will not be required to earn CEUs until the next two-year period.

Item 31. Amend subrule 82.11(3) as follows:

82.11(3) CEU approval. All activities for which continuing education credit will be granted must be approved by an accredited college or university, an issuing agency, or by the department, and shall be related to well services, GHEX loop borehole services, relevant aspects of Iowa groundwater law, well construction, well maintenance, well abandonment practices, well contractor safety (no more than 0.2 CEU per renewal), water system maintenance, and Iowa hydrogeologic conditions which protect groundwater and water supplies.

Item 32. Amend subrule 82.12(1) as follows:

82.12(1) Submission of records and samples. Each certified well contractor shall submit drilling records to the local county permitting authority and copies of drilling records and drill cutting samples, when required, to the Iowa Geological and Water Survey, Department of Natural Resources, Oakdale Campus, University of Iowa, Iowa City, Iowa 52242, telephone (319)338-1575, or as otherwise directed by the department, as follows:

Item 33. Amend paragraph 82.12(1)“a” as follows:

a. Within 30 days of completion of any water well used as part of a public water supply, a well used for withdrawal of water for which a permit is required by rule 567—50.1(455B), or wells used to monitor groundwater quantity or quality required by the department if so directed by the Iowa geological survey (IGS), department of natural resources. The certified well contractor must submit the drilling records and samples required by subrules 82.12(2), ~~and 82.12(3).~~, and 82.12(4).

Item 34. Amend paragraph 82.12(1)“b” as follows:

b. Within 30 days of the completion of any water well used as part of a nonpublic water supply or other water wells used to access groundwater. The certified well contractor must submit the drilling records and samples required by subrules 82.12(2), ~~and 82.12(3).~~, and 82.12(4).

Item 35. Adopt the following **new** paragraph 82.12(1)“c”:

c. Within 30 days of the completion of GHEX loop boreholes. The certified well contractor must submit the drilling records and samples required by subrules 82.12(2) and 82.12(3).

Item 36. Amend paragraph 82.12(1)"c" as follows:

~~d.(e)~~ Prior to constructing a water well to be used as part of a nonpublic water supply, GHEX loop borehole, or other water well used to access groundwater, the certified well contractor must contact the local health department in the county in which the water well is to be located to determine if submittal of drill cutting samples is required.

Item 37. Amend subrule 82.12(2) as follows:

82.12(2) *Drilling records.* Drilling records must be submitted on the water well driller's log form provided by the Iowa geological and water survey, department of natural resources.

Item 38. Amend paragraph 82.12(3)"a" as follows:

a. Location and legal description (quarter section, section number, township, range and county) or by global positioning system (GPS) in the degree decimal degree format (ddd.dddd.).

Item 39. Adopt the following **new** paragraph 82.12(3)"b":

b. Diagram of well or GHEX borehole field placement on property.

Item 40. Amend paragraph 82.12(3)"b" as follows:

~~b.c.~~ Reference point for all depth measurements.

Item 41. Amend paragraph 82.12(3)"c" as follows:

~~c.d.~~ Depth at which each significant change of formation occurs.

Item 42. Amend paragraph 82.12(3)"d" as follows:

~~d.e.~~ Depth at which pump is set, the nonpumping and pumping water levels in the well measured from the land surface, and the rate and duration the well was pumped.

Item 43. Amend paragraph 82.12(3)“e” as follows:

~~e~~f. Identification of the material of which each significant stratum is composed.

Item 44. Amend paragraph 82.12(3)“f” as follows:

~~f~~g. Depth at which hole diameters (bit sizes) change.

Item 45. Amend paragraph 82.12(3)“g” as follows:

~~g~~h. Normal hole diameter of the well bore.

Item 46. Amend paragraph in 82.12(3)“h” as follows:

~~h~~i. Total depth of the completed hole.

Item 47. Amend paragraph 82.12(3)“i” as follows:

~~i~~j. Depth or location of any lost drilling fluids, drilling materials, or tools.

Item 48. Amend paragraph 82.12(3)“j” as follows:

~~j~~k. Casing depth, grouting schedule, including materials used and method of placement, and description of the well casing and liner pipe or if a GHEX borehole system the diameter and DR of loop pipe, the depth to the U-bend assembly, the manufacturer of the pipe, and a description of any pipe end weight added to each loop.

Item 49. Amend paragraph 82.12(3)“k” as follows:

~~k~~ l. Description of well screens including diameter, length, material slot sizes, amount of open area, and location in well.

Item 50. Amend paragraph 82.12(3)“l” as follows:

~~l~~m. Description of physical and chemical well development activities.

Item 51. Adopt the following **new** subrule paragraph 82.12(3)"n":

n. Any additional information compiled as a result of increased department oversight as noted in 567—
Iowa Administrative Code Chapter 48.4, 48.7(1), and 48.8(1).

Item 52. Amend subrule 82.12(4) as follows:

82.12(4) *Cutting samples.* Drill cutting samples shall be collected at intervals of 5 feet and at each pronounced change in geological formation. The Iowa geological and water survey, department of natural resources, will provide drill cutting bags.

Item 53. Amend paragraph 82.13(1)"h" as follows:

h. Knowingly causing or allowing a hazardous or potentially hazardous condition due to well construction or GHEX loop borehole construction.

Item 54. Amend paragraph 82.13(1)"i" as follows:

i. Well ~~D~~drilling, GHEX borehole drilling, or well ~~or~~ reconstructing a well without a construction permit.

Item 55. Adopt the following **new** paragraph 82.13(2)"e":

e. Elimination of hazard. Elimination of the hazard created during the well services or GHEX borehole drilling.